

29 ANNUAL REPORT

OF THE

DIRECTOR

OF THE

South Dakota  
Agricultural Experiment  
Station

For Fiscal Year Ending June 30, 1916

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BROOKINGS, SOUTH DAKOTA

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# ANNUAL REPORT

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Mr. E. C. Perisho,  
President.

Dear Sir:

I have the honor to transmit herewith the annual report of the South Dakota Agricultural Experiment Station for the fiscal year ending June 30th, 1916.

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## THE STAFF

The personnel of the staff is practically the same as for last year. With two exceptions the entire staff is employed in a dual capacity, receiving part of salary from teaching and part from experimental funds. The amount is in proportion to time employed in each line.

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## THE WORK

The popularity of the results of the Station workers is increasing annually. Our results are quoted in many instances as authority. Our bulletins are used in some institutions as texts and their popularity is not by any means confined to South Dakota but is increasing in other states as well.

For convenience, there are five departments of the Station, as follows: Agronomy, Animal Husbandry, Chemistry, Dairy Husbandry and Horticulture. In each of these departments the work is outlined at the beginning of the year and each project is approved by the federal department.

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PUBLICATIONS

There were eight bulletins published on the following subjects:

161. Winter Grain in South Dakota.
162. First Annual Report of Vivian Experiment and Demonstration Farm.
163. Comparative Yields of Hay, from Several Varieties and Strains of Alfalfa, at Brookings, Highmore, Cottonwood, and Eureka.
164. Making Butter and Cheese on the Farm.
165. Corn Silage for Lambs.
166. Important Factors Affecting Machine Milking.
167. Transplanting Alfalfa.
168. Breakfast Foods and Their Relative Value.

We print an issue of 30,000 and distribute about 22,000.

One thousand dollars is appropriated by the state for printing popular bulletins; and, by the way, this is the only fund received from the state to supplement the \$30,000.00 received from the Federal Government.

**FINANCIAL STATEMENT**  
**EXPERIMENT STATION AND SUB-STATIONS**  
**Receipts, 1915-1916**

	Home Station	Highmore Sub-Station	Eureka Sub-Station	Cottonwood Sub-Station	Vivian Sub-Station	Miscellaneous	Total
Hatch .....	\$15000.00	\$.....	\$.....	\$.....	\$.....	\$.....	\$15000.00
Adams .....	15000.00	.....	.....	.....	.....	.....	15000.00
State Appropriations .....	.....	3000.00	2000.00	3000.00	4000.00	*1000.00	13000.00
Land Endowment .....	.....	.....	.....	.....	.....	2269.93	2269.93
Sales of Produce .....	2796.59	536.80	778.58	33.05	670.93	.....	4815.95
Balance on Hand, 7-1-15 .....	3793.36	.....	.....	.....	.....	2726.53	6519.89
Total .....	\$36589.95	\$ 3536.80	\$ 2778.58	\$ 3033.05	\$ 4670.93	\$ 5996.46	\$56695.77

\*Popular Bulletins



## Disbursements, 1915-1916

[illegible]

## EXPENDITURES BY DEPARTMENTS

Home Station, 1915-1916

	Hatch	Adams	Sta. Loc.	Total
Agronomy .....	\$ 1864.13	\$ 4489.11	\$ 760.02	\$ 7113.26
Chemistry .....	1486.37	1558.30	.....	3044.67
Executive .....	2701.48	.....	.....	2701.48
Horticulture .....	1840.85	5340.24	1361.52	8542.61
Printing .....	1909.03	.....	.....	1909.03
Animal Husbandry .....	3555.62	.....	2415.78	5971.40
Dairy Husbandry .....	1642.52	3612.33	394.40	5649.27
Total .....	\$15000.00	\$15000.00	\$ 4931.72	\$34931.72

## DEPARTMENT OF ANIMAL HUSBANDRY

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The experiment in feeding corn silage to lambs was completed and the results of the two year's tests published in bulletin No. 165.

The experiment in breeding sheep progressed nicely. Some excellent specimens were secured both as to individuality and quality of fleeces.

The first year's results in feeding silage, made of immature corn, to steers and also finishing for market were secured.

## COOPERATION WITH THE BUREAU OF ANIMAL INDUSTRY

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### *Black Leg Vaccine*

This department cooperated with the Bureau of Animal Industry, United States Department of Agriculture, in the distribution of black leg vaccine to the cattle raisers of the Northwest. During the twelve months we sent out 63,835 doses to 923 parties in Wyoming, Montana, North Dakota, and South Dakota.

## COOPERATION WITH THE BUREAU OF PLANT INDUSTRY

### MEMORANDUM OF UNDERSTANDING

*Between the SOUTH DAKOTA EXPERIMENT STATION  
and the Bureau of Plant Industry, U. S. Department  
of Agriculture, relative to cooperative investigations  
with cereals.*

Effective March 1, 1916.

The object of these cooperative investigations shall be (a) to improve the cereal industry of the Northern Great Plains region by introducing, or producing, better varieties than those now grown, especially with regard to yield, quality, earliness, hardiness, disease resistance, etc.; (b) to determine the best methods of tillage and crop rotation for grain production; and (c) to conduct such other experiments as may seem advisable for the accomplishment of the greatest good to the region named.

For the purpose of carrying on these investigations it is agreed:

1. That the South Dakota Agricultural Experiment Station shall furnish all necessary land and buildings, teams, machinery for sowing, cultivating, harvesting and thrashing, and all ordinary labor, apparatus and other supplies not provided by the Bureau of Plant Industry, and shall make available for use seeds of varieties already under experiment and results obtained at the station at Brookings and such substations as are now or hereafter may be established during the period this agreement is in force.

2. The Bureau of Plant Industry, subject to the approval of the Secretary of Agriculture, shall furnish seed

of all hybrids and standard varieties now in its possession that are likely to be at all adapted to the conditions under which these experiments are made, and seed of any new varieties of similar adaptation that may be acquired; and shall provide such assistant, or assistants, (as well as travel funds, labor, and equipment) as may be deemed advisable, at points in the State where cooperative investigations are being or hereafter may be conducted, the assistants to be jointly selected by and acceptable to both parties to this agreement.

Assistants or collaborators who may be appointed by the Department of Agriculture shall have the franking privilege only for the purpose of carrying on official correspondence concerning cereal work, sending cereal seeds to cooperators for testing, and mailing seeds and other specimens of cereals included in the cooperative experiments to the South Dakota Agricultural Experiment Station and substations and to the Bureau of Plant Industry.

3. The investigations carried on under this cooperative agreement shall be planned and conducted jointly by the duly authorized representatives of the South Dakota Agricultural Experiment Station and the Bureau of Plant Industry, and shall be subject to the approval of the proper authorities in each case. If desired, a detailed outline of plans (including expenditures) for the varying seasons may be attached to this agreement from time to time.

4. Seed of all new varieites of special value may be distributed in localities to which they are adapted, the distribution to be made in accordance with such plan as may be jointly agreed to by the Station and Bureau. The grain resulting from this cooperation shall belong to the Experiment Station provided that if seed is sold, the amount expended by the Bureau of Plant Industry under this agreement shall not exceed half the cost of the cooperative work after the proper credit has been made of the amounts realized from sale, or other disposition, of produce grown under this cooperation.

5. At the close of each season a complete report of the



results of the experiments conducted during the year shall be submitted by the assistant in direct charge of the cereal work, one copy to be furnished to the Bureau of Plant Industry and one copy to the South Dakota Agricultural Experiment Station, such report to be delivered as soon after the close of the season as practicable. When requested, thrashed and unthrashed samples of the grain under experiment shall accompany the report.

6. Both parties to this agreement shall be free to use in their official correspondence and in publications the results obtained in these investigations, each giving proper credit to the other cooperating agency.

7. This agreement shall become effective March 1, 1916, and shall remain in force until such time as in the judgment of either party its revision or termination may be desirable.

8. Upon the conclusion of this agreement both parties shall be at liberty to remove from the premises any equipment, apparatus, or other material which they may have furnished during the course of this cooperation.

Date, April 28, 1916.

JAMES W. WILSON,  
Director, South Dakota Agricultural  
Experiment Station.

Date, May 2, 1916.

WM. F. TAYLOR,  
Chief, Bureau of Plant Industry.

I include and make a part of this report the report of each chief of division which gives a detailed account.

Yours truly,

JAMES W. WILSON,  
Director of the Experiment Station  
and Animal Husbandryman.

DEPARTMENT OF AGRONOMY

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Director J. W. Wilson,  
South Dakota Experiment Station,  
College.

Dear Sir:

I have notice from you that the annual report of Adams and Hatch Projects may be submitted at any time. Accordingly I beg leave to hand you this somewhat brief written statement, reporting upon the projects singly, but not in great detail, owing to the fact that reports in the nature of bulletins will be submitted later.

*Adams Project No. 1*

A Project on the Influence of Rotations Upon the Maintenance of Soil Fertility.

This project has been in force, as now outlined, since 1911. The general plan of the project is to conduct several definite crop rotations continually on definite plots of land and, by means of chemical analysis, made at several periods of time, to discover in the several rotations, whether the total plant food content has increased or decreased. The project has not been altered in its general scope since it was inaugurated. It has been altered somewhat as to details. It is now being conducted as previously.

The plots included under this project being now sampled and analyzed are East Farm, Brookings, 440-449, 450-459, 140-149, 151-159, West Farm, 140-147, 240-243, 250-253, 340-347, 351-353, 440-447, 540-547, 550-553, 650-653, total 112 plots.

(1) Previously (see report of 1915) plots 140-159, East Farm, have been analyzed by H. Loomis, Agronomy

Analyst, for nitrogen, phosphorus and potassium, and also for calcium and magnesium. During the fiscal year just closed have been completed the analyses for total carbon and inorganic carbon, from which are computed organic carbon by difference.

### *Adams Project No. 2*

A Study of Correlations Between Certain Physical Characters of Plants and Their Capacity for Yield.

Object: To discover whether any given qualities of crop plants, e. g., length of head in wheat, weight or position of ear in corn, amount of leaf surface in cereals, are associated with heavy production.

Results: One correlation study at a time is being attempted. Our present study is to find the correlation between length of head in Minnesota 169 wheat and yielding capacity.

(2) It was previously reported (annual report 1915) that a correlation table showed a positive correlation of 1.48 between longer spikes and higher yield. The row yields employed in securing this result were those of the first year's harvest.

The harvest of the second year was discarded on account of rust.

The results of the present year are being tabulated at present. Indications point to a correlation of zero between length of the original mother head and the yield of the season just closed.

### *Adams Project No. 3*

A Project to Determine Definitely the Extent to Which Water Is a Limiting Factor in the Growth of

Sweet Clover (*Melilotus Alba*)

(3) Weights of Sweet Clover plants harvested from the special pots constructed for this project (see Report 1915) have been tabulated by Mr. Loomis. Results indicate tentatively that water requirement of sweet clover is different for different soil types.

It is desired to check the results of the first year with those of the second year just closed, and also to continue the series another year.

### *Hatch Projects*

Hatch projects include the breeding of corn for high protein and the possible correlation of high percentage protein in seed with high yield of protein per acre. The nature of this project was in part explained in Bulletin 153. It is found to be clearly possible for South Dakota farmers to select seed corn having a large percentage of protein. It is indicated further that a high percentage of protein in seed will result in high absolute amounts of protein per acre. This is evidently important for feeders who desire to produce the largest amount of feeding value per acre.

A large number of rotations are being conducted at Brookings field with Hatch funds. At present time the results of these rotations are being prepared for publication. A number of valuable results will be secured. The value of corn as a cultivated crop in rotations is well established, likewise it is found that winter wheat may well be given a place in the rotations. Following corn the mere matter of order of crops in their rotations has much to do with the resulting yield and consequent profit to the farmer.

At Brookings two systems of farming are being conducted side by side with Hatch funds, one of which is called a Grain System of Farming, the other is called a Live Stock System of Farming.

In the Grain System crop-residues are returned to the land, but no manure is returned thereto. In the Live-Stock System, the manure-equivalent of the crops taken away from the land is returned thereto, but no crop residues are returned.

It is assumed to be entirely practicable to maintain the fertility of the land with the Grain system, without the keeping of any live-stock whatever on the farm. One of the purposes of comparing these systems of farming therefore is to discover if possible, the ultimate result not only upon crop yields, but upon the profitableness of a farming system.

*Eureka Substation*

A representative set of rotation systems have been conducted at Eureka substation. One of the central ideas has been to discover what rotation will yield the greatest amount of feed for live stock, in the area represented. It is a safe conclusion that the earlier system of exclusive small grain farming is hazardous. The work of the Eureka substation has accordingly established the fact that the use of corn as a cultivated crop is of primary importance. This is true for several reasons. One of the reasons is that small grain makes much larger yields following a cultivated crop and furthermore when corn is produced it renders large amounts of feed available for live stock, and it seems very possible that live stock systems of farming should be encouraged for the vicinity of Eureka Substation. It is not straining a point to say that the area of corn in the vicinity of Eureka has been increased at least three times, due to the encouragement given that crop by the favorable results at the substation, the increased use of corn in farming systems together with the consequent increase of live stock production, due to the increased use of corn has returned the cost of Eureka Substation several times to the state. It has further been demonstrated that winter wheat sown on corn ground in the fall, may be brought thru the winter by employing a light straw mulch. Such a fact is of exceeding importance to the farming industry. Winter wheat often succeeds when spring sown grain fails.

*Highmore Substation*

It is well known throughout the United States among people who have connection with experiment station work that there is no more complete set of experiment plots anywhere in the country or even in the world, than at Highmore, South Dakota. The Highmore station has a country-wide reputation for the large number of varieties introduced and propagated and which have come to be specially adapted to the Great Plains area. Such varieties of grain as Sixty Day and Swedish Select Oats, Hannchen and Odessa barleys,



Kubanka and other durum varieties of wheat, Turkestan, Grimm and Vale alfalfas and several strains of corn and grain sorghum, all of which have done much to supply feed for live stock and food for people, have all been closely associated in their development with Highmore Substation. Whoever knows the history of farming in South Dakota is aware that although there are many problems still to be solved, that many things are now known that were not known about meeting actual conditions, before Highmore Sustation was established. Permanent and profitable farming has advanced substantially in South Dakota and much of this benefit has come from the work at Highmore.

At the present time a bulletin on the subject of flax culture is being published by the Agronomy Department, number is 169. The work done at Highmore which is consistent with that done at the other station fields indicates that the flax crop on old ground in South Dakota has failed time and again throughout the state for lack of early seeding. Apparently the date of seeding flax on old ground in South Dakota should be on or about April 15. Seeding at later dates has generally been the rule and consequently it has been accepted as a fact that flax could not be produced on old ground in our state. It is reasonable to hope that this flax bulletin number 169, reporting results from Highmore and elsewhere will be worth many dollars to the state and furthermore greatly accelerate the flax industry. Up to date the dearth of flax seed has created rather a serious situation with the production or lack of production of linseed oil for paints and other necessities.

#### *Cottonwood Substation*

A part of this work with flax has also been conducted at Cottonwood. A notable rotation system at Cottonwood has included the so-called "three-row" system of cultivating small grain. Small grain is put in after corn in strips of three rows each, space for cultivation is left between the rows.

One of the first small fields of sweet clover grown in South Dakota in the west river area was at Cottonwood



Substation. Since this field was seeded the area of this crop has considerably increased to the benefit of the live stock industry in that part of the state. Not all farmers in the area are satisfied absolutely that sweet clover will become a fodder crop of great value, but many of them are satisfied in this particular. For instance in the vicinity of such towns as Kadoka and Kennebec some areas of sweet clover have been utilized for hay and pasture and live stock production.

At Cottonwood Substation also a very successful experiment with seeding alfalfa into low prairie without plowing by means of discing the seed into grass, has been conducted. This means of increasing the productiveness of the natural pasture and also of adding nitrogen to the forage may be expected to add wealth to the state.

Also at Cottonwood extensive experiments have been conducted with the cultivation of small grain. A most successful rotation in the present year is corn followed by wheat cultivated with oats, followed by sweet clover also cultivated. It is evident that in such a rotation another small grain might be substituted for wheat. The present indication is however that such a rotation will flourish with a minimum amount of moisture, due to the amount of cultivation which will be given. It is evident also that such a rotation may supply crops which may be largely or entirely used as feed for live stock. It is well always to recall that **all LIVE STOCK PRODUCTION IS BOUND TO BE MEASURED IN ANY COUNTRY BY THE AMOUNT OF CROPS WHICH CAN BE PRODUCED FROM THE SOIL OF THAT COUNTRY.** It is true that one of the great resources of South Dakota is grass for live stock and it is also true that live stock does not live by grass alone. In discovering rotations that will produce the largest amount of feed for live stock Cottonwood Substation has rendered the greatest service to the area of country it represents.

#### *Vivian Substation*

Vivian Substation is established by law on a slightly different basis from the other substations. The demonstra-

tion feature is emphasized as well as the experimental feature. As a matter of fact a number of projects have been successful at Vivian, which were previously tried out at Cottonwood and at other substations. All projects started at Vivian have been those which it was expected would probably be successful from the standpoint of demonstrating methods most profitable for farmers. The first annual report of Vivian Experiment and Demonstration Farm has already been published as bulletin number 162 of this station. This report will of course be available to any citizens of South Dakota, upon request.

Since the publication of bulletin 162 careful records have been kept and the accounts of the Vivian station have just been balanced for the past fiscal year. The figures of this balance will not be here extended in full. Present indications are that so far as the last year is concerned the most profitable elements of the business at Vivian farm were hogs, horses and real estate.

During the the past year certain bulletins have been published which are as follows:

161.—Winter Grain in South Dakota. August, 1915.

162.—First Annual Report of Vivian Experiment and Demonstration Farm. October, 1915.

163.—Comparative Yields of Hay from Several Varieties and Strains of Alfalfa at Brookings, Highmore, Cottonwood and Eureka. January, 1916.

169.—Flax Culture in South Dakota. August, 1916.

Very truly,

A. N. HUME,

Agronomist and Supt. of Substations.

## DEPARTMENT OF CHEMISTRY

Mr. James W. Wilson,

Director of the Experiment Station.

Dear Sir:

1. The Hatch Project with Sugar Beets, has been carried on with the best of success. Progress has been made in securing beets of uniformly high sugar percentages. This fact taken with the high tonnage per acre secured is very gratifying. This coming year a bulletin will be prepared giving the results in detail not only of the percentage yields but also of many items bearing on sugar beet culture in detail. Spacing tests have been continued.

Much work has also been done in seed production and in siloing beets in the field. The results obtained confirm my previous conclusion that the State is well adapted to sugar beet culture.

2. The Adams Project with Unbalanced Wide Rations with Horses has been brought to a close so far as the feeding work is concerned. The horses have been slaughtered and careful autopsies made. Photographs have been made of the disastrous effects caused by lack of protein. It has been proven that navicular disease together with necrosis of the bones can be produced by too wide rations. The bulletin giving results will appear the coming year. The chemical work is well on its way to completion.

3. Cooperative work. Analyses of feeds for the Department of Animal Husbandry have been made during both years. For the Agronomy Department analyses of roots have also been made for two years.

4. Complete analyses of the different brands of Breakfast Foods on the market have been made and the results published in a bulletin which also gives a discussion of these foods from an economical standpoint.

Very respectfully,

JAMES H. SHEPARD,

Chemist.

## DEPARTMENT OF DAIRYING

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Director James W. Wilson,  
College.

Dear Professor:

The experimental work in the Dairy Husbandry Department during the last college year has been chiefly a continuance of the work in progress during the previous year. This department has continued to work with both Adams and Hatch Funds.

Only one project has been under investigation with the Adams money, namely, "The Role of Water in a Dairy Cow's Ration."

The last experimental period in this project has been completed. This consisted of studying the effect of giving a dairy cow only one-half the amount of water she normally drinks.

Physical examinations of the cows were made regularly. Complete chemical analyses were made of all the food consumed and of all the outgo from the cow—feces, urine and milk. In addition, atmospheric and body temperatures were regularly kept.

A large amount of data is the result. I shall not in this report give any of the details. This department has now completed all of this experiment. The same will be handed to you in bulletin form within a short time.

This department is now ready to take up the study of the effect of different proteins in the different feeds on milk production. No more than this one project will be studied this coming year under the Adams Fund.

Under the Hatch Fund, several projects have been studied. Some of these have now been completed. The

investigations pertaining to the pasteurization of cream at different temperatures and the keeping properties of butter made from cream pasteurized at different temperatures have now been completed. A bulletin has already been written, and will be in your hands for publication within a few days.

The study of the different methods of storing ice on the farm and the different methods by which ice may be obtained on the farm has also been completed. The data will be compiled as soon as possible and sent to you for review and publication.

The experiment with seven leading makes of milking machines has been continued. During these investigations, it was found that there were important factors aside from the milking machine that should be carefully considered in order to make machine milking a practical success. A bulletin was published on this phase of machine milking during the last year.

Extensive experiments were conducted with the view of finding which substances were the most practical and the most efficient in which to keep the different parts of the milking machine between milkings. Our results strongly indicate that ordinary lime is not only the cheapest, but also the most efficient.

We wish to continue the further study of the different types of milking machines during this year. There are several different factors which can not be determined without continuing this experiment for successive years.

In addition, the data pertaining to the feeding and the production and the breeding of the dairy herd has been recorded. I refer especially to the data resulting from improving and grading up the herd with the use of a pure bred dairy sire. This department now has the results of nine years of consecutive work.

Sincerely yours,

C. LARSEN,  
Prof. of Dairy Husbandry.



## DEPARTMENT OF HORTICULTURE

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James W. Wilson, Director,  
South Dakota Agricultural Experiment Station.  
My dear Sir:

The work of the Department of Horticulture the past year has made progress along the lines indicated in previous reports. Creative horticulture is the chief line of work since the prairie Northwest needs hardier and better orchard and small fruits. A special feature of the work of this department each year is the introduction of new fruit trees, ornamentals, and other new plants. The following is a brief description of the new varieties sent out for trial spring 1916:

### *Apples*

I have as yet no candidate for the hardy winter apple that is so much needed for the prairie Northwest, but am still at work on the problem. The following four varieties of apples merit a trial and will also afford a test of the Siberian crab stock, which is really preliminary to work with the new apple seedlings now appearing. The names are all Russian, viz., Ivan, a man's name; Adno, one; Dolgo, long; Sereda, Wednesday.

*Ivan Crab Apple.* Offered for the first time. One of our many seedling crabs. Noteworthy for the calyx segments being absent in the ripe fruit, the same as in the pure Siberian crab (*Pyrus baccata*). Fully one and three-fourths inches in diameter, roundish oblate, good color, marbled with stripes and orange red; acid.

*Sereda Apple.* Offered for the first time. From seed of the Harry Kaump top-grafted on Oldenburg (Duchess) apple. Resembles Yellow Transparent and of similar very



early season, but more regular in form. Yellow, juicy, sprightly subacid.

*Adno Apple.* Offered for the first time. Very handsome, large, red, subacid, productive, late fall apple, received from Russia. Adno is my provisional name until the true name can be determined.

*Hibkee Apple.* This variety, offered for the first time, is a puzzle. A graft-hybrid of Hibernial and Milwaukee; the fruits so far show the flesh and core of Milwaukee and the surface coloring of Hibernial. For my method of grafting these split buds see Bulletin 88, plate 13. Such hybrids are now called periclinal chimeras. It is desirable to ascertain whether this proves stable under propagation. The name Hibkee is made up from the names of these two varieties.

*Dolgo Crab Apple.* Offered for the first time. At the annual exhibits of this Department at the South Dakota State Fair many have asked about the remarkably long conical, intensely bright red crabs we used for making letters. This is one I brought over from my second trip to Russia in 1897. A vigorous productive tree and so far free from blight. Fruit full of juice, jells easily, makes a rich ruby red jelly of beautiful color and excellent flavor.

### *Plums*

*True to Seed Series.* The first step in my project of breeding plums true to seed to avoid the necessity of budding and grafting. T. T. Seed No. 1 is a seedling of Opata. T. T. Seed No. 2 is a seedling of Ezaptan which is of the same pedigree as Sapa. I am not sure this plan will be desirable as the trees would need to be isolated when in bloom, either by tenting the trees or by planting them far from other trees. Some of them will no doubt revert, others will come true. To complete this work, seedlings should be raised and only those saved that come true.

### *Some New Vegetables*

*Hansen's Turkestan Radish.* Much like a flat turnip in size and form, but with red skin and of remarkably mild flavor. In my estimation, a very great advance in radish

culture. In 1913 at Semipalatinsk, Siberia, I found this as something new, having been brought to Semipalatinsk by the natives of the dry interior of Turkestan about four years previously. A favorite table vegetable when peeled and eaten with butter. A few packets of this seed were sent out in the spring 1914. A correspondent at Arcola, Manitoba, writes: "The radishes were excellent, of fine flavor. I used six of them at different times and found them to be the best radish for this climate I have found."

*Muskmelon, Hansen's Siberian No. 1.* A large yellow smooth muskmelon with white sweet flesh, quality very good. Found in cultivation on the driest steppes near Semipalatinsk, Siberia, in 1913. I deem it desirable to offer a few packets of this and the three following to experimenters now, instead of waiting. All are extra early since they ripened in that northern region of early frosts.

*Muskmelon, Hansen's Siberian No. 2.* Found in the same region as the preceding lot. This may prove to be identical with No. 1. More roundish in form.

*Watermelon, Hansen's Siberian No. 1.* Smooth, round dark green, very early with red sweet flesh. Also from near Semipalatinsk, Siberia.

*Watermelon, Hansen's Siberian No. 2.* A fine watermelon from the dry steppe region forty miles southwest of Semipalatinsk, Siberia.

#### *Some New Ornamentals*

*Siberian Almond (Amygdalus nana L.)* A desirable dwarf ornamental shrub from the dry steppes of Siberia, with abundant bright, rose pink flowers, among the very first to bloom in the spring. Good in front of other shrubs. Raised from our own importation from Siberia.

*Siberian Buckthorn.* Raised from seed I gathered from wild plants at Semipalatinsk, Siberia, 1913. The plants were in fruit instead of in flower at the time so that the botanical name remains to be determined.

*Siberian Lavatera. (Lavatera Thuringiaca).* A tall growing perennial flower from the Semipalatinsk steppes. Height 5 to 7 feet. Branching habit; flowers pink, some-

what of the style of single Mallows or Hollyhocks. A Manitoba experimenter gives a favorable report of this flower and wants more seed. There can be no question as to its hardiness in exposed situations. The flowers will be improved by selection.

*Rosa rugosa.* The well known beautiful hardy rose with dark crimson single flowers up to four inches in diameter. Attractive ornamental in autumn and early winter with large bright red fruits, which are used, with seeds removed, for food in its native home. Our own importation, descended from the original introduction from Siberia by the Imperial Botanical Gardens at Petrograd, Russia. The Siberian form of this species is superior to the Japanese form.

#### *Prairie Nut Culture*

Hazelnuts and Black Walnuts are two of the most promising plants for the open prairie in the line of nut culture. Some plants were distributed of the following:

*Manitoba Hazelnut.* Ornamental as well as useful. The need is apparent of a nut-bearing shrub for the open prairie. We now have the wild native hazelnut of Manitoba in the third generation under cultivation.

*New Ulm Black Walnut.* The farthest northwestern limit of the native black walnut is probably near New Ulm, Minnesota. This lot of trees began to bear at seven years from the seed. A few two-year trees of the second generation were sent out for trial.

#### *Siberian Crabs for Apple Stocks*

In Bulletin 65 of this Station I urged the trial of Siberian roots to prevent the root-killing which is often disastrous at the North. The experiments are still in progress. In the fall of 1915 we seeded fully 50 barrels of various Siberian crab apples and this seed gave a good stand last spring.

The Siberian crab and Hybrid Siberian crab are winning favor as the only stocks that will insure freedom from root-killing. The main difficulty is to obtain the

stocks in a commercial way. In the orchard at this station the Wealthy apple has borne abundantly on this Siberian stock. The tree is somewhat dwarfed in habit but this may be an advantage for the farmer's orchard as it makes spraying more feasible.

### *Work With Alfalfa*

The distribution of my new Russian and Siberian alfalfas has been done mainly under special state appropriations. My machine transplanting method has hastened this work very greatly as by this means 1 pound of seed is sufficient to set 20 acres instead of the old method of 20 pounds for one acre. I am endeavoring to standardize and perfect the method before recommending it for general adoption. The results are summarized in Bulletin 167, June 1916, on Transplanting Alfalfa. The experience of many farmers who are working with me on dry uplands shows that the setting of one year plants is a certainty while under the same conditions the sowing of seed is a total failure. This was abundantly demonstrated in the total crop failure years of 1911, 1912 and 1913 in certain sections, and led to the 1913 and 1915 state appropriations for completing the work. It is distinctly a problem for the dry western uplands. The perfecting of the method demands the aid of one having training in a commercial nursery. To complete the work of alfalfa distribution, the state legislature appropriated \$6,000 for the biennium beginning July 1, 1915. My work as Agricultural Explorer for the United States Department of Agriculture has necessarily given me some new ideas which it seems only fair that I should be given time to develop in a small way, since the work is along wholly new lines and can easily be done with the present equipment and with very small expenditure of time and money, considering the advantages to be gained. What may be termed a by-product of this alfalfa work is given in bulletin 159, a field method of hybridizing alfalfa by transplanting the parent plants alternately. In the spring of 1915 these hybrid alfalfas proved perfectly resistant to the several late freezes, the last one

coming June 9th. I think this method will be found of wide usefulness.

Alfalfa work the past three seasons has been conducted mainly on the uplands of the western half of the state, especially at Lemmon, Pierre, Sansarc, Cottonwood, Kadoka, Whitewood and many other places. This work was done on farms with the cooperation of the owners. In Stanley county and three of the adjoining counties there are now over 2,000 acres of Cossack alfalfa and the acreage is increasing rapidly. One of the illustrations in my bulletin 167, was a single plant of the Cossack alfalfa grown on upland without irrigation at Wall, western South Dakota, and exhibited at the South Dakota State Fair, 1915. The growth shows first and second crop together. Total weight of this plant as shown was 8 pounds, dry weight. The general experience of hundreds of farmers is that the Cossack is the heaviest and best seeder they have ever found, as well as being very productive of good hay, and resistant to heat, cold and drouth. It recovers very quickly after cutting.

The Semipalatinsk for the driest uplands is proving its value in many states thruout the West from the Mexican border north to Alaska. It is distinctly a special purpose alfalfa, as in its native home it makes abundant hay on eight inches annual rainfall.

*Conclusion.*

My conclusion from all this alfalfa work is that if the state could aid and guide the work of getting a million acres of our driest uplands of our far western states into the right kind of alfalfas and certain other drouth-resistant plants, it would prevent the usual exodus of disappointed settlers when the dry seasons come again.

Yours truly,

N. E. HANSEN,  
Horticulturist.